

CLAIMS

1. A magnetic sensor comprising:

a magnetic sensitive member whose electromagnetic characteristics vary by the action of an external magnetic field;

a driving circuit for supplying a current to the magnetic sensitive member;

a detection coil wound around the magnetic sensitive member; and

a sample-and-hold circuit for measuring an induced voltage value which is the magnitude of voltage induced in the detection coil,

wherein the sample-and-hold circuit is configured to measure the induced voltage value in synchronization with an interruption of the current performed by the driving circuit.

2. The magnetic sensor according to Claim 1,

wherein the sample-and-hold circuit is configured to measure the first peak value in time in a damped oscillation waveform of the induced voltage value, the damped oscillation waveform varying with time in response to the interruption of the current.

3. The magnetic sensor according to Claim 1,

wherein the sample-and-hold circuit comprises timing-retaining means for retaining a predetermined timing in response to the interruption of the current performed by the

driving circuit, and the sample-and-hold circuit is configured to measure the induced voltage value in synchronization with the interruption of the current with the predetermined timing,

wherein the predetermined timing is equal to a timing at which the induced voltage value in damped oscillation exhibits the first zero-crossing in time in the interruption of the current passing through the magnetic sensitive member held in the external magnetic field whose intensity is substantially zero.

4. The magnetic sensor according to any one of Claims 1 to 3,

wherein the driving circuit comprises voltage-retaining means for retaining a minimum voltage value being the induced voltage value measured by the sample-and-hold circuit when the external magnetic field having a minimum magnetic field intensity detected by the magnetic sensor acts on the magnetic sensitive member; and the driving circuit is configured to interrupt the current in a state in which the induced voltage value converges within a voltage range equal to or less than 5% of the minimum voltage value.

5. The magnetic sensor according to any one of Claims 1 to 4,

wherein the driving circuit is configured so that a pulse current variation serving as the current acts on the

magnetic sensitive member; and a rise time required to raise the magnitude of the current up to a predetermined current value is set to be from 3 to 30 times an interruption time to interrupt the current at the predetermined current value.

6. The magnetic sensor according to any one of Claims 1 to 5,

wherein the driving circuit comprises a capacitor storing electric energy serving as a supply source of the current and an electronic switch arranged in an electrical path between the capacitor and the magnetic sensitive member; and

the current supplied from the capacitor to the magnetic sensitive member is interrupted by the use of the electronic switch.

7. The magnetic sensor according to any one of Claims 1 to 6,

further comprising an electrode wiring board having a groove extending in one direction, the groove filled with an insulator having an electrical insulating property,

wherein the magnetic sensitive member is an amorphous wire arranged so as to pass through the insulator along the groove direction of the groove; and

the detection coil has a spiral electrical path in which a first coil unit arranged on a groove surface being an inner surface of the groove and a second coil unit

arranged on a groove top being an outer surface of the insulator are combined.

8. The magnetic sensor according to Claim 7,  
wherein the magnetic sensitive member is an amorphous wire having a diameter from 1  $\mu\text{m}$  to 30  $\mu\text{m}$ ; and  
the detection coil has a winding inner diameter equal to or less than 200  $\mu\text{m}$ .